

An Update on Arthrogyposis Multiplex in Cattle

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During the past eight weeks (since September 8, 2008), researchers at the University of Illinois and the University of Nebraska, in collaboration with the American Angus Association, have been investigating the genetic condition called Arthrogyposis Multiplex (AM), commonly referred to as "Curly Calf Syndrome (CCS)" in Angus cattle. At this time, we feel it is important to provide some details concerning the results of this research and provide answers to some frequently asked questions that we have encountered.

We are pleased to announce that the research has been very successful thus far and we are nearing completion of our work. Using breeder reports on AM affected calves as well as DNA samples obtained from these calves and many of their parents, we have been able to identify the gene and mutation that we believe is responsible for this genetic abnormality. From this information, we have developed an accurate DNA-based diagnostic test that can be used to assess an individual's status for AM. As part of test development, we have been able to provide the genotypes and AM status of 736 AI sires and feel that it would be beneficial to release these results to the industry.

These sires were used as an essential part of our research for three purposes. Firstly, a broad cross section of genetics representing the Angus breed is necessary to assess the validity of any diagnostic test that is developed. This assessment is based on the principle that because AM is a lethal abnormality, and because we assume a recessive mode of inheritance, there should not be any living animals that are homozygous for the mutation. Secondly, if our assessment is correct and we have identified the mutation that causes AM, then the results of testing would provide genotype information for all of the sires submitted. This would allow breeders to assess the genetic risk of their breeding programs and prepare for implementation of future testing programs. Lastly, this sampling provides an overall assessment of the frequency of the mutation within the entire Angus population and provides insight for the development of policies aimed at management within the population.

The naming scheme that we have chosen to use for this test identifies animals as having one of three possible genotypes. If an animal is homozygous for the normal variant (called an allele) we refer to them as **AM-Free (AMF)** indicating that they have been tested for the causative mutation and been found to be "free" of the mutation. Therefore these animals are unable to transmit it to any of their offspring. If the individuals are tested and found to be heterozygous or "carriers" for the mutation, meaning that they possess one normal allele and one mutant allele, they are referred to as **AM-Carrier (AMC)**. These animals pass the mutation on to approximately half of their offspring. Although affected calves are rarely tested, they would be homozygous for the mutation and referred to as **AM-Affected (AMA)**. This nomenclature is based on several concepts. Firstly, although the term "curly calf" certainly describes the outward appearance of some of these calves, the term is also problematic for a couple of reasons. Because of the tremendous global success of the Angus breed we need to consider the international implications of the terminology that we use. For example, in Australia the term "curly calf" is commonly used to describe a form of arthrogyposis that is caused by viral infection and not genetic mutation. Thus, in Australia the "curly calf" term might cause some confusion between the two forms of the disease, e.g. infectious or genetic. Secondly, the term used should have relevance to the more technical aspects of the disease, particularly for veterinary professionals who might encounter the condition as part of their practice. In these

instances, if they are unfamiliar with the condition it is more likely that they will investigate it using the medical descriptors and not common terminology. Lastly, there is a precedent for describing these recessives that has scientific merit and is already in place within other organizations. In this case we have decided to use the term Arthrogyriposis Multiplex (AM) as the technical name for this condition. This reflects not only the most obvious characteristic of the condition, but also indicates there are multiple abnormalities associated with the condition. Additionally, AM also fits well with a gene-based naming system that will become more obvious as the results of the research are presented in the scientific literature.

In regard to the accuracy of the test, there are two distinct components that contribute to how the DNA test performs. The first component involves the scientific data that underlie the test. The second component is the design and execution of the diagnostic assay performed as part of the testing procedure. From a scientific standpoint, the AM test is based on the presence of a specific change or mutation in the DNA sequence of specific genes of an animal. For AM, this change is the complete deletion of a segment of DNA that encompasses two different genes (a gene is a sequence in the DNA that encodes a protein). One of these genes is expressed at a crucial time in the development of nerve and muscle tissue. The mutation results in no protein being produced from this gene and therefore it is unable to carry out its normal function, referred to as a loss-of-function mutation. After identifying the specific mutation, experiments were conducted to validate the relationship between the mutation and AM. Based on these experiments, we believe that the scientific basis of the test is accurate; in other words, testing for this specific mutation will lead to correct classification of any animal. In regard to the diagnostic assay that is used for determining an animal's AM status, the test has undergone several optimizations that also lead us to believe that the test is highly reproducible and accurate. However, as with any task requiring human intervention, errors can occur. Of course, we do our best to limit any errors that occur by automating portions of the test and appropriately incorporation of testing controls. Although we cannot guarantee perfection, we estimate the assay may have an error rate of around 1 in 10,000. Therefore, for the listed AI sires we believe the following results to be accurate. These results are being released prior to the availability of commercial testing services. We intend to facilitate access to commercial services within the next 30 to 45 days.

Name	Registration No.	AM Status
Skylandmere 2058	2719761	AMF
R R Rito 707	5770651	AMF
Rito 707 of Ideal 533 70	6810901	AMF
Band 602 of Ideal 928 72	7530738	AMF
Jetliner 707 of Conanga	7795918	AMF
Q A S Traveler 23-4	9250717	AMF
Rito 9J9 of B156 7T26	9682589	AMC
Tehama Bando 155	9891499	AMF
Pine Drive Big Sky	9894245	AMF
Scotch Cap	10226429	AMF
Paramont Ambush 2172	10239760	AMF
Basin Emulation 5653	10312571	AMF
R&J Spade 1204	10566557	AMF
R R Traveler 5204	10705768	AMF
G D A R Rito 596 L T	10717881	AMF
N Bar Emulation EXT	10776479	AMF
S A F Power Fix	10809778	AMF
Gorthy of Graham 18866	10842597	AMF
G D A R Equalizer 6148	10845727	AMF
S S Traveler 6T6	10889102	AMF
G D A R Traveler 71	10988296	AMF
Rito 8E8 of 5H11 Traveler	11072078	AMC
Med Rock Traveler JR	11086635	AMF
V D A R New Trend 315	11105489	AMF
Nugget 801X of J R S	11107151	AMF
Hoff Northlander S C 6029	11138672	AMF
Hoff Spade Flush S C 678	11138705	AMF
Hoff Hi Hand S C 654	11138729	AMF
Hoff Bold Scotch S C 491	11138801	AMF
G T Maximum	11160685	AMF
G T Expo	11160688	AMF
Patton Enticer	11194446	AMF
Schoenes Fix It 826	11196470	AMF
Ginger Hill Duster 89	11216670	AMF
Rito 9M9 of 2036 Scotch Cap	11223752	AMF
Rito 9FB3 of 5H11 Fullback	11223766	AMF
G D A R Traveler 9161	11278961	AMF
G D A R Centennial 911	11279048	AMF
Hoff Balancer S C 7109	11288972	AMF
Hoff Hi Flyer S C 7134	11297283	AMF
R&J Maxima	11314694	AMF
O C C Maternal Trend 725Y	11335168	AMF
G A R Sleep Easy 1009	11356568	AMF
Sitz Traveler 8180	11367940	AMF
Westwind Rito 8503 D J H 019	11391800	AMF
Finks Future Trend	11408407	AMC

B/R New Design 036	11418151	AMF
Basin E Z	11424367	AMF
G D A R Wham 021	11447288	AMF
G D A R Traveler 044	11447335	AMF
L R A New Trend 360	11447845	AMF
Woodhill Valor	11451070	AMF
Woodhill Triple Threat	11451073	AMF
R&J Maternal Power 270	11478173	AMF
G A R Precision 1680	11520398	AMC
Rito 1H13 of 5C7 Rito 9J9	11527181	AMF
N Bar Cornhusker Y2741	11553377	AMF
S V F Hi Road	11556105	AMF
V D A R New Trend 802	11563543	AMF
Hyline S V F Rito 1116	11581539	AMF
V D A R Traveler 722	11592069	AMF
Hoff Triumph S C 927	11594860	AMF
Hyline Travel Agent	11595790	AMF
Minerts Fortune 2000	11618176	AMF
California Traveler	11618614	AMF
R R 9440 Scotch Cap 1483	11620571	AMF
Ideal 1418 of 8103 4286	11626546	AMF
W F A Four Point Four	11640955	AMC
Rito 2E2 of 9FB2 Traveler	11656252	AMF
Becker Farms Pompey 118	11672313	AMF
Rito 2RT2 of 0B5 RR Traveler	11691408	AMF
S A Double Power 1002	11702184	AMF
Leachman Conveyor	11741667	AMF
S A F Neutron	11747039	AMF
Mill Coulee Performer 224	11779097	AMF
Summitcrest Hi Flyer 3B18	11783725	AMF
Danina Northerner	11789903	AMF
Summitcrest Scotch Cap 0B45	11847053	AMF
G A R Bingo 4192	11872308	AMF
Nichols Easy Way 428	11887141	AMF
Spring Cove True Value	11924057	AMF
Whitestone Traveler 2149	11927423	AMF
Whitestone Fly Traveler 3006	11927444	AMF
S A F Fame	11935889	AMF
S A F Easy Fortune	11935897	AMF
Leachman Explorer	11947213	AMF
Basin Max 602C	11951654	AMF
Rito 3M2 of 5H11 GT Maximum	11967378	AMC
V F Venture Forward	11973186	AMF
Woodhill Supreme	11973368	AMF
Brooks Premium 302	11983278	AMF
TC Bonus	11994557	AMF
Gardens Prime Time	12007667	AMF

G T S V F Treasury	12019395	AMF
B C C Bushwacker 41-93	12048084	AMF
Leachman Saugahatchee 3000C	12075716	AMF
G A R Evas Prescription 4553	12079809	AMC
G A R Evas Consistence 3803	12079812	AMF
B F Raindancer 012 306	12096699	AMF
Leachman Booster	12108074	AMF
One Way E308	12127839	AMF
Thomas Latigo	12139259	AMF
S A F Choice Plus	12155777	AMF
BT Direction 65D	12162865	AMF
Gardens EXT 4137 S2	12166857	AMF
Woodhill Crossfire	12170322	AMF
Mill Coulee 6807-423	12174018	AMF
Mr Wix of Mc Cumber 204	12177814	AMF
G T Sentry	12189371	AMF
Plowman 1627 of Millbrae SAR	12194989	AMF
Homestead Blockbuster 409	12222286	AMF
J L B Exacto 416	12223258	AMF
L F New Trend 4100	12223857	AMF
Butchs Maximum 3130	12241684	AMF
R R Ferdinand 758D	12257225	AMF
G T Triple Band	12270349	AMF
C S U Aggie Ambush 4109	12296482	AMF
G A R 6807 Traveler 4144	12304120	AMF
Rito 5TR8 of Rita 3X12 RRT	12306217	AMF
GDAR SVF Traveler 234D	12309327	AMF
S A F Banker	12326204	AMF
Boyd Mainstream 5006	12344131	AMF
Twin Valley Precision E161	12346200	AMF
VDAR KA Legacy	12392161	AMF
B T Ultravox 297E	12396224	AMF
Rockn D Ambush 1531	12396365	AMF
Gibb Illini	12422806	AMF
Hoff Ultra S C 108	12430389	AMF
B A R Ext Traveler 205	12452829	AMF
K C Prime Time 6029 95	12455165	AMF
C A Future Direction 5321	12493607	AMC
Sitz Intensifier 8206	12528428	AMF
Rito 6I6 of 4B20 6807	12530601	AMF
G A R Expectation 4915	12548568	AMF
N Bar Prime Time D806	12557724	AMF
Bon View Spectrum 1176	12564177	AMF
B/R New Design 036-631	12569815	AMF
B C C Lariat 6Z1 of B749	12578945	AMF
PLS Rawhide F405	12597077	AMF
S A F Focus of E R	12618076	AMF

T C A Engineer	12619399	AMF
Circle A 216 LTD 6517	12670840	AMC
Dalebanks Extender 6012	12672258	AMF
Woodhill Riptide 823-606	12677801	AMF
Gardens Expedition	12689078	AMF
Connealy Frontline	12693793	AMF
G A R Explosive 6313	12698439	AMF
G A R Precision 9296	12717041	AMC
Millcreek Diversity	12740561	AMF
Connealy Vision 63	12753461	AMF
Sitz Value 7097	12755998	AMF
C S U Optimum Traveler 7123	12781813	AMF
TC Advantage	12783078	AMF
Bon View New Design 1407	12783540	AMF
Champion Hill B52 Traveler	12799597	AMF
Vermilion Dateline 7078	12810693	AMF
N Bar Emulation Ext A1747	12811512	AMF
N Bar Bando 598 X4127	12813090	AMF
P A R B Design Plus 97	12835604	AMF
Barretts Solution	12837915	AMF
A&b Yukon 7150	12862009	AMF
Boyd Bluegrass 7047	12874222	AMF
Brooks Ext 792	12881292	AMF
Connealy Leadtime	12893612	AMF
Perry Power Design 715	12911472	AMF
Summitcrest Prime Cut 1G42	12915498	AMF
G A R Exacto 5687	12920200	AMF
Equity of P A R	12955187	AMF
Sitz Reliant 8898	12996570	AMF
C R A Bextor 872 5205 608	13009379	AMF
Connealy Bottomline	13026915	AMF
J R Something Special	13039059	AMF
Bon View New Design 208	13044574	AMF
Gardens Highmark	13047487	AMF
Boyd New Day 8005	13050780	AMF
Northern Improvement 4480 GF	13054003	AMF
Hyline Right Time 338	13058662	AMF
Bon View New Design 878	13062750	AMF
Ideal 7451 of 8103 4465	13066872	AMF
Three Trees Everready C55D	13080972	AMF
O C C Great Plains 943G	13092912	AMF
S S Decatur 55H	13103836	AMF
Creekstone Austin LTD 812	13113153	AMF
Summitcrest High Prime 0H29	13122485	AMF
Connealy Forefront	13169229	AMF
G A R Pinnacle	13200618	AMF
Nichols Extra H6	13207590	AMF

S S Traveler T510 8T4	13213164	AMF
Feltons Meat Packer 62	13221587	AMF
Fountains Fortress 52	13246306	AMF
G A R Grid Maker	13254554	AMF
G A R Paramount	13254727	AMC
E X A R Scotch Cap 816	13282661	AMF
R P Bushwacker 3 944	13284421	AMF
B/R New Design 323-9150	13286230	AMF
B/R Destination 727-928	13286246	AMF
Basin Max 104J	13288602	AMF
EXAR Anchorage 9479	13296807	AMF
S A F Choice Plus 8275	13308692	AMF
Ironwood New Level	13320150	AMF
G T Premium Design 919	13321276	AMF
H A R B High Plains 975 JH	13324510	AMF
S A V Limited Edition 9283	13331795	AMF
S A F Focus 9095	13333906	AMF
S A F Strategy 9015	13334022	AMF
KMK Alliance 6595 I87	13346328	AMF
Baldrige Julio 157J	13352944	AMF
Ardrossan Jackson J6	13356290	AMF
BT Right Time 24J	13360311	AMF
Leachman Boom Time	13361440	AMF
Summitcrest Outlook	13384754	AMF
Summitcrest Pfred 3B18 0J98	13384794	AMF
Woodhill Confidence	13392170	AMF
G A R Retail Product	13395329	AMF
G A R Predestined	13395344	AMF
Brooks Premium 910	13404446	AMF
Baldrige Nebraska 901	13412671	AMF
WAR Alliance 9126 6006	13433023	AMF
Tosu Mick 9301	13436290	AMF
Lemmon Seven Plus	13438124	AMF
Hinds Hills TLAR Long Cut 47	13441628	AMF
Connealy Lead On	13447282	AMF
L T 598 Bando 9074	13448453	AMF
S A F Mogcks Security	13457421	AMF
Shamrocks Advantage 4609	13458027	AMF
Vermilion Payweight J847	13469989	AMF
Plattemere Database	13481798	AMF
F A R Krugerrand 410H	13498476	AMF
S A F Focus J30	13504290	AMF
S A V 8180 Traveler 004	13512009	AMF
Oak Hollow 7709 of 1318 1118	13521189	AMF
Sitz Greatplains 9520	13531361	AMF
S A F Connection	13544928	AMF
Leachman Diamondback	13567991	AMF

S A F Directive	13574137	AMF
Byergo Full Cut	13582536	AMF
B/R New Frontier 095	13588640	AMF
S A V Final Answer 0035	13592905	AMF
Kapp Corner Post	13599697	AMF
RAB-GAR Load Up 4049J	13608406	AMC
Pascalar Ayres New View P310	13608527	AMF
ER Denton K240	13619920	AMF
Mohnen Modern Design	13620649	AMF
ER Falcon K177	13626625	AMF
RCC Preference	13645514	AMF
LCC Number Crunch 3050K	13654637	AMF
LCC New Frontier 3215K	13654695	AMF
S A F Millcreek Charisma	13659860	AMF
Larkota 814Z 011	13664352	AMF
D B New Horizon 020	13665765	AMF
Summitcrest Diamond 0K24	13667844	AMF
Millers Bullseye J373	13670548	AMF
Connealy Forecast	13676338	AMF
Double G Marksman	13676998	AMF
K C F Bennett Total	13687063	AMF
Bushs Grand Design	13697595	AMF
G T Echo	13708459	AMF
Woodhill Admiral 77K	13712447	AMF
S A F Factor	13718618	AMF
SydGen Sterling 0298	13718631	AMF
G A R Yield Grade	13724351	AMF
G A R New Design 5050	13728513	AMF
Fintry of Graham 52170	13739339	AMF
H A Image Maker 0415	13739532	AMF
Stukels Bandwidth	13742799	AMF
Nichols Extra K205	13752642	AMF
Three Trees Prime Cut 0145	13761928	AMF
S S Objective T510 0T26	13776378	AMF
FHCC Classic Rock	13778330	AMF
Genetics by Design 049	13791489	AMF
Rito 1I1 of 2536 Rito 6I6	13793825	AMF
Rito 1I2 of 2536 Rito 6I6	13793826	AMF
Rito 1I96 of 3015 Rito 6I6	13796655	AMF
RES Volunteer 051	13798592	AMF
Exar Sudden Impact 1537	13806056	AMF
W C C Precision E161 J239	13806971	AMF
Exar Expand 1241	13808820	AMF
ACF New Design 0321	13814652	AMC
Connealy Mayor 898	13815252	AMF
Gardens Wave	13818764	AMF
R&R Architect 0223	13822057	AMF

Thomas Precision 1594	13824224	AMC
SydGen Original 1013	13824342	AMF
Boyd On Target 1083	13828202	AMF
Basin Rainmaker 747L	13830028	AMF
Connealy Viewpoint 901	13831100	AMF
SydGen 1531 Ambush 1149	13834593	AMF
N A Powerline of 206T	13838168	AMF
Circle A Accurate 1038	13839683	AMC
W C C Special Design L309	13846942	AMF
SydGen Refocus	13850227	AMF
4 Point 8 of Ironwood	13850307	AMF
Leachman Fundamental	13874784	AMF
S A V Front Runner 0713	13875837	AMF
S A V 5175 Bando 0699	13875838	AMF
YON Southern Rock L26	13878619	AMF
Baldrige Lightning L72	13880447	AMF
Mytty In Focus	13880818	AMF
King Kahn B100	13895274	AMF
H S A F Bando 1961	13896250	AMF
BR Midland	13898124	AMF
Gibb Iroquois 9111	13907951	AMF
E&B 1680 Precision 1023	13913492	AMF
Summitcrest Commando	13913514	AMF
L C R Precision 112	13930599	AMF
LCC Dillon G689L	13934918	AMF
Woodhill Foresight	13936986	AMF
LD Exactly 1912	13959251	AMF
Exar Foundation 1806	13961547	AMF
Holiday Express 1852	13961577	AMF
Connealy Danny Boy	13966936	AMF
H A Power Alliance 1025	13992383	AMF
Summitcrest Roseda Designed	13998476	AMF
RAB-GAR Satisfaction 4191L	14009358	AMF
RAB-GAR Leverage 4222L	14009384	AMF
G A R Precision 5771	14011376	AMF
G A R Precision 6041	14011400	AMC
G A R Prime Design	14011547	AMF
G A R Encore	14011611	AMF
Morgans Direction 111 9901	14021056	AMF
Exar Lutton 1831	14035047	AMF
Krone Royal 1140	14037690	AMF
Hyline Right Way 781	14037894	AMF
R3 Scanner L527 SCC	14048508	AMF
Rito 2X15 of Rita 8Z22 EXP	14056739	AMF
Rito 2A63 of 2536 205	14084300	AMC
Rito 2B94 of Rita 6K20 BW	14084352	AMF
Rito 2V1 of 2536 1407	14088249	AMC

SydGen Contact	14088423	AMF
Tehama Gridmaker L234	14091783	AMF
Sitz New Design 349M	14094252	AMF
Circle A Endeavor 2058	14098261	AMF
SydGen Focus 2088	14099897	AMF
EXAR Make the Grade 234	14100695	AMC
VDAR Predicta Bull	14101541	AMC
SydGen Ally	14104725	AMF
SydGen Prestige 1316	14106302	AMF
SydGen 1407 Corona 2016	14106303	AMC
C F Right Design 1802	14116881	AMF
LD Redirect 11	14121653	AMF
Vermilion Nebraska M404	14128747	AMF
EXG Prime Plus M737 R3	14139259	AMF
Three Trees Exacto 1517	14139514	AMF
Boyd Captain 2067	14144643	AMF
B C Matrix 4132	14159119	AMF
RES Exceed 114	14167786	AMF
D C C Rito Prime 1I5	14171230	AMF
Twin Eagles No Fault M904	14173159	AMF
Riverbend Blueprint L24	14181726	AMF
B C Marathon 7022	14187839	AMF
B/R Ambush 28	14188956	AMF
Rito 2 878 of 2536 BVND 878	14200755	AMF
Mill Brae Freightliner 2096	14201376	AMF
Champion Hill Edition 2029	14202761	AMF
Triple J Design of Foxcross	14204395	AMF
Bluegrass Major Design 202	14209689	AMF
S A V Last Call 2063	14215210	AMF
Connealy Alliance 995	14216456	AMF
Connealy Onward	14216491	AMF
Connealy Safe Lead	14216571	AMF
LCC Sultan G041	14218202	AMF
LCC New Standard	14218253	AMF
G A R 65R Authority	14222526	AMC
G A R Cimarron	14222595	AMF
G A R Integrity	14222612	AMF
G A R Solution	14222615	AMC
EXAR New Look 2971	14230122	AMF
KG Dakota	14230973	AMF
TC Gridiron 258	14237017	AMF
BT Equator 395M	14237157	AMF
K A R Alliance 258	14245842	AMF
Tehama Total M811	14251765	AMF
DDA Emblazon 27C	14257843	AMF
21AR Coal Bank C014	14267926	AMF
Blevins Raindance 2503	14270028	AMF

SydGen Eclipse 2478	14291315	AMF
Dr J Analyst M250	14292649	AMF
SydGen Bouncer 2458	14298428	AMF
S S Rito Rito R011 2R12	14299352	AMF
G A R Premium Product	14300920	AMC
G A R US Premium Beef	14301014	AMF
Sinclair Net Present Value	14311951	AMF
H A R B Windy 702 JH	14321158	AMF
Spur Success 2801	14327307	AMF
EXAR Nominal 3550	14343264	AMF
Lafllins Cutting Edge 2075	14355577	AMF
Sinclair Open Range 2Q23	14357467	AMF
G G Chisholm	14361794	AMF
Boyd Poundmaker 21	14367367	AMF
Stevenson American Idol 9273	14368395	AMC
Stevenson Benchmark N190	14368434	AMF
Sitz Rainmaker 9723	14368850	AMF
Big Elban of Sydgen 3023	14377095	AMF
Sinclair Rito Legacy 3R9	14378386	AMF
EXG Osage N112 R3	14381890	AMF
EXG Midnight N657 R3	14382607	AMF
EXG Outcross N655 R3	14384566	AMF
B/R Future Direction 3100	14385286	AMF
B/R 65R Genesis	14385395	AMF
S A R New Frontier 095 1156	14386761	AMF
EXAR Numerical 3919	14390643	AMF
B C Maverick 2702 ET	14391235	AMF
B C Mid Emblazon 854E 702	14394786	AMF
SydGen OnStar 3217	14395270	AMC
B C Emblazon 854E 8023	14397563	AMF
Basin Future Direction 8833	14400977	AMC
Basin Future Direction N905	14401002	AMF
EXG Rangeland 3946	14404295	AMF
EXG Heartland 3947	14404296	AMF
Circle G Kash 2189	14412753	AMF
K C F Bennett Architect M299	14416680	AMF
K C F Bennett Coalition SCC	14417348	AMF
Kenny's Creek Sandy S15	14418962	AMF
G T Shear Force	14419184	AMF
Basin Payweight 9333	14419602	AMF
RAB-EGL Blue Moon 4407M	14422326	AMF
K M Future Direction 3902	14424083	AMF
Ironwood Innovator	14429978	AMF
Ayres Sudden Revival of OCC	14434266	AMF
ALC Nobleman N01N	14448891	AMF
M A R Midland Empire 3092	14454058	AMF
S A V Peacemaker 3179	14455342	AMF

O C C Magnitude 805M	14456390	AMF
S A V Hemi 3133	14458258	AMF
Sitz New Design 458N	14474596	AMF
ER Justice N013	14492305	AMF
S A V Trailblazer 3015	14495534	AMF
L T Bandwagon 3105	14502851	AMF
G A R User Friendly	14504755	AMF
K M Keystone 1913	14505152	AMC
G A R Preeminent	14506274	AMC
Bushs Strut 756	14508531	AMF
BT Crossover 758N	14509685	AMC
Riverbend Mile High 3718	14512407	AMC
Three Trees Next Step	14513180	AMF
Mohnen Brushpopper 353	14514372	AMF
LRA Foresight 26C	14515789	AMF
K C F Bennett Index	14521474	AMF
Ideal 3542 of 7451 7417	14523007	AMF
Connealy Overtime	14528172	AMF
Connealy Leader	14528246	AMF
Connealy Reflection	14528330	AMF
EXAR Non-Stop 3967	14529106	AMF
Summitcrest Sears Star Power	14542822	AMF
Summitcrest High Prime 0N15	14542824	AMF
Brooks Night Off 309	14551206	AMF
Baldrige Navigator N5	14552847	AMF
ALC Big Eye D09N	14560689	AMF
D C C Rito Direct 3C3	14570071	AMF
LCC New Chapter G831N	14570934	AMF
SydGen Substance 3450	14573335	AMF
SydGen Boom Time 3483	14573363	AMF
D C C Rito Platinum 3J4	14575900	AMF
Woodhill Commander 143L-132N	14576247	AMF
Sinclair Telecast 01S3	14587431	AMF
Lemmon Newsmaker N156	14591941	AMF
Sugar Loaf Direct Hit N021	14595121	AMF
LCC Outlook G800N	14599782	AMC
LCC Arrival G847N	14599797	AMC
LCC Innovation H009N	14599814	AMF
LCC Few Dollars More H013N	14599815	AMF
4G Regulator	14608561	AMF
Whitestone Tiger T159	14630766	AMF
Rito 4612 of Rita 8G23 1I2	14631681	AMF
Rito 4D7 of 2536 338	14631852	AMF
Rito 4L41 of Rita 2B41 208	14631908	AMF
Rito 4L6 of 2536 208	14641538	AMF
F R F Midland 4026	14657131	AMF
Stevenson CE Deluxe 1914	14659834	AMF

Quaker Hill Objective 3J15	14660859	AMF
SydGen Platinum 4027	14663248	AMF
SydGen Itasca 4083	14663267	AMF
SydGen Kahlua 4204	14664625	AMF
EXAR Predictable 4158	14667449	AMF
EXAR Problem Solver 4181	14667450	AMF
B/R New Day 454	14675445	AMF
B/R Future Direction 4268	14675477	AMF
Monarch Pahokee 3016	14676756	AMF
3F Emblazon 3652	14679694	AMF
EXAR Pit Boss 409	14682821	AMF
Basin Yellowstone 116P	14686102	AMF
Basin Franchise P142	14686137	AMF
Basin Up The Limit	14686155	AMF
SydGen Rito Plus 4051	14686985	AMF
EXAR Phenomena 4037	14687512	AMF
GDAR Game Day 449	14691231	AMF
DAJS The Matrix 008	14693095	AMF
SydGen Journey 4355	14712641	AMF
Basin Rainmaker P175	14724271	AMF
S A V 004 Density 4336	14725035	AMF
EXG New Design P620 R3	14728662	AMF
Genex Replica 1081	14737017	AMC
S A V Net Worth 4200	14739204	AMF
Gardens Prime Star	14740749	AMF
LT Curve Bender 4810 of EA	14742267	AMF
G A R Prominent	14743506	AMC
Bonnors Up The Limit 7P	14745477	AMF
Woodlawn Charge On 14	14754153	AMF
Rito 4I6 of 2536 6807	14768724	AMC
Rito 4I9 of 2536 6807	14768727	AMF
Rito 4L60 of 2536 BVND 208	14768728	AMC
Rito 4S5 of 2536 SA	14768733	AMF
Boyd Landmark 405	14769662	AMF
Sinclair Extra 4X13	14774030	AMF
MCC Daybreak	14777016	AMF
Ideal 4355 of OT26 2440	14779044	AMF
G A R High Mesa	14790816	AMF
Summitcrest Designer 177P	14790998	AMF
B C Lookout 7024	14791623	AMF
Woodhill Mainline	14793708	AMF
Brooks Easy Way Out 4260	14796227	AMF
S A V 5175 Bando 4597	14798552	AMF
S A V 004 Traveler 4836	14798616	AMF
G A R Simplicity	14800786	AMC
Doerr Defiance	14802410	AMF
TC Boom Time 434	14814936	AMF

Sitz Hindsight 973P	14817265	AMF
S A V 004 Predominant 4438	14823655	AMF
S A V 004 Hold'em 4452	14823656	AMF
S A V Bachelor 4404	14823774	AMF
TC Power Stroke 4118	14840492	AMF
S A V Initiative 4406	14842384	AMF
Connealy Foundation 426	14843192	AMC
Connealy Freight Train	14843254	AMF
Connealy Resource FD 464	14843300	AMC
TC Total 410	14844711	AMF
TC Rito 416	14844714	AMF
TC Beef Maker 480	14844728	AMF
Connealy Whitman	14845068	AMF
Connealy Grant 208 4246	14845081	AMF
Mohnen Day Ahead 144	14848339	AMF
Summitcrest Complete 1P55	14850409	AMF
SCR Promise 4042	14851313	AMF
Tehama Vigilance P139	14852720	AMF
MOGCK Whispering Wind 584	14874385	AMF
Mytty ForeFront 77P	14874578	AMF
SydGen Triumph	14880311	AMC
K C F Bennett Performer	14885809	AMF
Dunlouise Cortachy Boy D137	14898814	AMF
Blevins Retail Design 4812	14899284	AMF
Rockin Horse Tailor Made 456	14899673	AMF
Basin Center Cut	14931356	AMF
Ardrossan Connection X15	14933037	AMC
Rito 593 of 2821 RP	14934706	AMF
EXAR Rejuvenator 5401	14961745	AMF
Sitz Upward 307R	14963730	AMF
Sinclair Excellency 5X25	14969822	AMF
Basin Future Direction 3R01	14973975	AMF
SydGen Bullet	14977480	AMF
EXAR Rito 5118 of Rito 112	14984112	AMF
Diamond On Track 748R	14993300	AMF
Stevenson Cattleman R142	15003218	AMF
Stevenson Moneymaker R185	15003238	AMF
EXAR 263C	15012747	AMF
Stevenson Paycheck 9415	15015207	AMF
Quaker Hill Rito 2V1 4V1	15016931	AMC
Three Trees Crossroads R0638	15022955	AMF
D R Retail Product 4637	15026357	AMF
Diamond Direct Deposit 3R57	15030668	AMC
Basin Expedition R850	15031034	AMF
G A R Right Direction	15033947	AMF
BC 7022 Raven 7965	15034593	AMF
Diamond Benchmark 3R65	15041285	AMF

Autumn Oaks Super Star 302	15076709	AMF
GAR-EGL Protege	15098880	AMF
Circle S At Ease 4221	15098911	AMC
S A V Future Investment 5662	15107823	AMC
S A V Mandan 5664	15107825	AMF
S A V New Year 5320	15108200	AMF
S A V Bismarck 5682	15109865	AMF
N U Option 5012	15118068	AMF
Brooks Premium Product 547	15124610	AMF
Summitcrest Direction 2R71	15125595	AMC
Bluegrass Right Time 500	15127569	AMF
G A R Selective	15129617	AMF
G A R Objective 7125	15129674	AMF
G A R Cloudburst	15134123	AMF
B P F Special Focus 504	15140670	AMF
Rito Revenue 5M2 of 2536 Pre	15142281	AMF
Rito 5M43 of 2536 PRED	15142305	AMF
LT Timberwolf 5014	15147477	AMF
Connealy Power One	15148585	AMF
Connealy Thunder	15148659	AMF
Connealy Compass 510E	15148739	AMF
Mytty In Line	15148954	AMC
Connealy Contrast	15150605	AMF
Connealy Danny 5398	15150630	AMF
Connealy Black Baron of SCAR	15150757	AMC
HA Program 5652	15161251	AMF
SCR Superior 210M-50203	15163839	AMF
CAR Efficient 534	15170660	AMF
HD Dunn Altitude 5011	15183035	AMF
Tehama Band XL R739	15183732	AMF
Tehama Reputation	15186606	AMC
V A R Midland 5271	15191744	AMF
LCOC Repairman G430R	15213792	AMC
Blevins Mission 5709	15231166	AMF
Stevenson Bullseye 3R11	15247770	AMF
T K Big Bend R35	15249612	AMF
RDDA Overload 2437R	15260057	AMF
EXAR Spartan 6225	15262910	AMF
EXAR Showton 6230	15262914	AMF
Rito 6EM3 of 4L1 Emblazon	15266350	AMF
Rito 6EM6 of 4L3 Emblazon	15266353	AMF
EXAR Prime Premium 6444	15276737	AMF
G A R Prediction	15283265	AMF
G A R Predestined N5905	15283299	AMF
Rito 6656 of 021 Rito 112	15310366	AMF
HARB Pendleton 765 J H	15313140	AMF
Sitz JLS Forward 568S	15327227	AMF

T O S U Hawk 5306	15330093	AMF
SydGen C C & 7	15330743	AMF
Three Trees Rocky Top	15331756	AMC
Three Trees Big Top S1116	15331769	AMF
ThreeTrees Blackfoot Mile Hi	15331771	AMC
Basin Bellagio 410S	15331879	AMF
Basin Payweight 025S	15332038	AMF
Basin Payweight 006S	15332050	AMF
SydGen Mandate 6079	15337433	AMF
Boyd Next Day 6010	15347911	AMF
Casino Objective B135	15349689	AMF
SydGen Trust 6228	15354674	AMF
Trowbridge Crusader 614	15355003	AMF
Thomas Grade Up 6849	15356040	AMF
K C F Bennett Outlook R448	15365425	AMF
S A V John Wayne 6220	15369092	AMF
S A V Heritage 6295	15369205	AMF
Basin Dollar B 9916	15371285	AMF
Sinclair Extravagant 6X7	15380785	AMF
Stevenson Online 11S0	15384833	AMC
Whitestone Satisfaction	15393885	AMF
M A R Jefferson 6009	15396062	AMF
Lafllins South Wind 5258	15418431	AMF
BC Rocket 44	15430961	AMF
E&B Blueprint 691	15434180	AMF
Three Trees Ante Up T0170	15443045	AMF
M A 1961 Bando 346-90	15446550	AMF
Exar PAF Sizzle 620	15456246	AMF
Summitcrest Rush Hour 0S23	15456344	AMF
Summitcrest Darth 1S37	15458959	AMF
Summitcrest Stardom 1S54	15458960	AMF
TC Advantage Plus 680	15462668	AMF
G A R Symmetry	15463997	AMF
G A R Remedy	15464017	AMC
G A R Ultimate	15464043	AMF
EXG Masterson 6011 PPC	15470489	AMC
G A R Game On	15482196	AMF
Limestone Converter S239	15487342	AMF
Tehama Silverado S105	15488048	AMF
Mill Brae Bluestem 6081	15488089	AMF
Connealy Full Freight	15490794	AMF
Connealy All Around	15490811	AMF
Connealy Forward	15491633	AMF
Connealy Formation 60C	15493207	AMF
Rito 6EMA of 4L3 Emblazon	15498429	AMF
Rito 6M51 of Rita 2V5 Pred	15498627	AMF
Spur Reward 6005	15507991	AMF

MRCC New Idea 629	15509162	AMF
Mr JT High Light 638	15513053	AMF
T D L Nine Irons Preemptor	15515066	AMF
T D L Nine Irons 3335S	15515072	AMF
S D R Chief Justice 662	15518651	AMF
V A R Prime Rate 6254	15521467	AMF
Tehama Online S472	15522896	AMF
F V 20K King 308M	15539210	AMF
Connealy Impression	15543702	AMF
SydGen Turbo 6684	15553710	AMF
Mohnen Dynamite 1356	15585939	AMF
B C C Emblazon 6062-6022	15599345	AMF
Sinclair Eclipse	15601553	AMF
Quaker Hill On Board 6BT2	15601884	AMF
Five Star Sum Total 6010	15606026	AMF
G T Global Image	15607046	AMF
V A R Prospector 7093	15623928	AMF
RM Ruger 6502	15626702	AMF
ALC Shooter B01S	15630936	AMF
Sitz Jackson 431T	15637146	AMF
Sinclair Multi-X	15644157	AMF
Exar 263C 7256	15661253	AMF
Circle A Endurance 6679	15667302	AMF
S A V Pioneer 7301	15688392	AMF
Basin Expedition 3T90	15690301	AMF
Basin Spread 304T	15690358	AMF
Basin Future Direction 2T15	15694062	AMF
Basin High Definition 3T84	15696204	AMC
Stevenson Moneymaker 576T	15696472	AMF
Thomas Synergy 7261	15700047	AMF
SQ Credence 67S	15705880	AMF
EXAR Titlelist T011	15714917	AMF
G T Tender Force	15723180	AMF
Prime Maker Plus	15729763	AMF
Baldrige Progressive S834	15730796	AMF
Werner Westward 357	15738589	AMF
Three Trees Lexington T0678	15743897	AMC
Yon Future Focus T219	15748572	AMF
ONeills Encore	15753349	AMF
CSU Ram Nation 7105	15774209	AMF
PVF ALL PAYDAY 729	15779234	AMF
S S Insight T20	15790033	AMF
Efficiency NFI	15793806	AMC
Basin Mile High 60T4	15799258	AMC
Ardrossan Admiral A2	15807819	AMF
Garret's On Target 323C	15816127	AMF
WAR Architect T040	15817542	AMF

MCATL Triple Stack	15818622	AMF
UI Peer Reviewed T083	15823918	AMF
Mill Brae Shawnee 7156	15827916	AMF
Lemar Dakota Gold 18T	15828386	AMF
Leachman Prowess G136T	15829455	AMF
Lyons Santa Fe 6119	15832299	AMF
Lyons Prairie Fire	15832303	AMC
Connealy Answer 71	15832579	AMF
Connealy Wrangler	15832596	AMF
Connealy Right Answer 746	15832750	AMF
SCR Right Cross 70024	15836708	AMF
TC Aberdeen 759	15840414	AMF
Leachman GB Meteor G677T	15862795	AMF
Koupals B&B Balance 7022	15866553	AMC
21AR Roundup 7005	15883460	AMF
Poss Total Impact 745	15885405	AMF
MOGCK Sure Shot	15899735	AMF
Leachman Ramses G054T	15907167	AMF
Leachman Scotsman G023T	15909868	AMF
Leachman Disciple G046T	15911861	AMF
Sinclair 20/20	15913232	AMF
Leachman Meat Case G049T	15914175	AMF
Leachman Authentic G067T	15914177	AMF
Nichols Quiet Lad T9	15922661	AMF
Duff Standout 785	15934618	AMF
Basin ON Target 7T16	15940911	AMF
Summitcrest Grid Buster T096	15957231	AMF
Blue and Gray Lee V04	15973416	AMF
Blue & Gray Jackson 90V	15974345	AMF
RM I Trend 7528	15989605	AMF